PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in or relating to the Manufacture of Sign Members

We, NEEDLE INDUSTRIES LIMITED, a British Company of 106, Edmund Street, Birmingham, in the County of Warwick, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The present invention relates to a new or improved sign member having indicia, data, characters, pattern or ornament (hereinafter referred to generically as markings) and further relates to a method of producing such sign member.

The invention has many possible fields of application among which may be mentioned the provision of sheets, panels, strips or tabs bearing markings of a kind to furnish identification, operating, or measurement data in a wide variety of apparatus or articles.

Further, the invention may be applied in cases where as an alternative or in addition to markings consisting of letters, numerals, symbols and graduated or other positional indicia having a primarily utilitarian purpose, it is required to provide markings of decorative or ornamental form upon apparatus or articles.

According to the present invention a sign member having a marking is produced by acting simultaneously upon superimposed sheet-forming laminae of pressure-deformable plastics material as hereinafter defined of contrasting colours so as to raise the marking in relief on an exposed face of one of the laminae, and removing at least part of the raised marking to expose the underlying lamina and thereby present a marking in the contrasting colour thereof upon the background of the first said lamina.

The expression "pressure deformable plastics material" means a synthetic resin capable of undergoing permanent local deformation without fracture either in the cold (i.e. at normal atmospheric temperature) or under suitable heating conditions.

The laminae may be pre-united together by fusion or by an adhesive.

The raised marking in relief may be formed in suitable cases by pressure exerted on the underlying face of the sheet by means of a ball-pointed, roller-pointed, or other suitable stylus, and which is traversed over the underlying face to trace out the marking required.

In such a case support for the opposite face of the sheet i.e. that from which the relief is to be raised might be afforded by either a further travelling member having a sheet supporting face formed with a recess or indentation which is maintained in registration with the stylus or by a stationary member having an indentation or recesses conforming in configuration to the marking to be made, or by a member having a locally yieldable surface.

In a preferred manner of carrying out the method, however, the raised marking in relief is formed by a pressing operation conducted against the underlying face of the sheet with a punch having the marking formed in relief on its operative face. The opposite face of the sheet may be engaged by a die the operative face of which has the marking formed thereon in intaglio or by a member having a locally yieldable surface.

The invention further resides in a method of producing a sign member having a marking comprising the steps of acting upon opposite faces of a pre-formed sheet composed of laminae of pressure-deformable plastics materials as hereinbefore defined in solid form and of contrasting colours with a punch and die having the marking formed on their respective registering operative faces in relief and intaglio in a manner such as to effect a permanent deformation of the sheet and raise material in relief out of the exposed face of the lamina engaged by the die the raised material including some material from the underlying lamina, and removing some or all of the raised material to produce an aperture or aper-

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tures in the first said lamina and hence exposure of the underlying lamina, thereby presenting the marking in the contrasting colour thereof on the background of the first said lamina.

The removal of all of the raised material will produce a marking flush with the face of the sheet out of which the marking was originally raised. The removal of only some of the material but sufficient thereof to expose the underlying lamina will produce a marking in relief of which the medial portion of each raised element is of the underlying lamina while the peripheral margin is of the background lamina.

Various methods of removal of the raised material may be employed, for example the material may be abraded.

A particularly advantageous method and one which is found to produce sharp outlines in the marking is to cut or shear the raised material by means moving substantially parallel to the face of the background lamina.

We have found the fused laminae of polyvinyl chloride are especially suitable for use in carrying out the method. Alternatively we may use laminae of cellulose acetate secured together by adhesive.

A further part of the invention resides in the provision of a sign member formed of laminated sheet material the laminae whereof are formed of pressure-deformable plastics material as hereinbefore defined and are preunited with each other over their contiguous faces and of contrasting colours, one of the laminae forming the background for the marking having one or more apertures in accordance with the marking required and formed by indenting the underlying lamina to produce raised portions on the background laminae which are partly or wholly removed to expose the underlying lamina through the resulting aperture or apertures.

In one form the underlying lamina extends into said aperture or apertures so as to lie flush or substantially flush with the face of the background lamina.

Alternatively the background lamina has one or more raised but medially apertured portions, and a portion of the underlying lamina enters into the aperture or apertures of the raised portion or portions.

In the foregoing method and in the sign member produced thereby it will generally be convenient to use a laminated sheet formed of two laminae, but it is to be understood that the invention includes the use of sheets formed of a greater number of laminae when desired.

The invention is illustrated in the accompanying drawings wherein:—

Figure 1 shows a portion of a strip of laminated material to which the method of the invention has been applied to produce a sign member.

Figure 2 is a cross sectional view on the line 2—2 and on an enlarged scale, and

Figure 3 is a view similar to Figure 2 showing an intermediate stage in the method of production of the sign members.

In the drawings we have shown one manner of carrying out the method of the invention applied to the production of small tabs or pieces of sheet material each of which are required to bear a visual marking such as the numeral eight indicated at 10.

The laminated material may be in the form of sheet of strip composed of two laminae 11 and 12 preferably of polyvinyl chloride which are fused or otherwise caused to adhere together. Each individual lamina 11 and 12 may have a thickness lying in the range 0.02 inches to 0.005 inches a preferred value being 0.015 inches, but it will be understood that in particular cases this preferred range may be exceeded if an especially stiff or rigid tab or piece is required, or laminae having a thickness less than this range may be used if an especially flexible piece or tab is required. The laminae may be of different colours, for example the lamina 11 may be red and the lamina 12 may be white.

Alternatively the two laminae may be of the same colour but of differing shades so that there is sufficient contrast to permit of one laminae being readily observed against the background of the other.

To produce the required marking the strip or sheet is preferably operated upon by press tools engaging opposite faces one of these tools engaging with the outer face of the lamina 11 being in the form of a punch having the particular marking required formed thereon in relief, whilst the other tool which engages the outer face of the lamina 12 may be in the form of a die in which the marking is formed in intaglio the two tools being brought together against opposite faces of the laminated sheet or strip with their marking in registration with each other.

Preferably the cross sectional shape of the formations on the punch which stand out in relief to produce the marking is of triangular or truncated triangular form in the latter case producing depressions 13 of truncated triangular shape, as seen particularly in Figure 3, and the intaglio formation on the die may likewise be of triangular or truncated triangular cross section to produce raised portions 14 on the outer face of the lamina 12.

The intaglio formation of the die may be an exact mate of the relief formation provided on the punch but preferably we arrange that in the limiting position of closure of these tools towards each other (which may be defined by stop means independent of the laminated sheet) there is a uniform or approximately uniform separation between opposed portions of the relief and intaglio formations, this separation being somewhat less than the thickness of the laminated sheet but greater than the

thickness of the individual lamina 12 which is ultimately to form the background lamina.

With this arrangement of relief and intaglio formations on the punch and die the sheet is subjected to a combined drawing and bending operation in the localities of the raised portions 14 and depressions 13, and although not apparent from Figure 3 of the drawings the thickness of the sheet measured between the base of the depressions 13 and the underlying surface 15 of the raised parts is generally somewhat less than the thickness of the surrounding undeformed portion of the laminated sheet.

The next stage of operation is to remove some or all of the raised portions 14 so as to expose the lamina 11 through the resultant aperture in the lamina 12 which is produced by the removal of the raised material.

This removal may be effected by means such as a plane, knife, or shear blade moving parallel to the outer face of the background lamina 12. If the whole of the raised portion 14 is removed the marking will be flush and if only part of the raised portion 14 is removed the marking will consist of a medial exposed portion of the lamina 11 and a peripheral margin consisting of the parts of the raised portion 14 which have not been removed.

If desired heat may be applied to the background lamina 11 at least on the locality where deformation has taken place to produce the marking this causing the material of the background lamina 11 to recede somewhat towards its undeformed state so that the portions of material which are exposed through the apertures in the lamina 12 lie below the outer face thereof and a recessed marking is produced.

Polyvinyl chloride when subjected to deformation and subsequently heated to an appropriate temperature for a short period say in the range 90° to 120°C reacts in this way and is commonly known as a "memory" plastics material. It will be understood that other plastics materials having like properties or "memory" may also be utilised where a recessed marking is required to be produced.

What we claim is:—

1. A method of producing a sign member having a marking comprising acting simultaneously upon superimposed sheet-forming laminae of pressure-deformable plastics material as hereinbefore defined of contrasting colours so as to raise the marking in relief on an exposed face of one of the laminae, and removing at least part of the raised marking to expose the underlying lamina and thereby present a marking in the contrasting colour thereof upon the background of the first said lamina.

2. A method according to claim 1 wherein the laminae are pre-united together by fusion or by an adhesive.

3. A method according to claim 1 or claim 2 wherein the raised marking in relief is formed by pressure exerted on the underlying face of the sheet by means of a ball-pointed, roller-pointed, or other suitable stylus, and which is traversed over the underlying face to trace out the marking required.

4. A method according to Claim 3 wherein support for the opposite face of the sheet is afforded by either a further travelling member having a sheet supporting face formed with a recess or indentation which is maintained in registration with the stylus, or by a stationary member having an indentation or recesses conforming in configuration to the marking to be made, or by a member having a locally yieldable surface.

5. A method according to Claim 1 or Claim 2 wherein the raised marking in relief is formed by a pressing operation conducted against the underlying face of the sheet with a punch having the marking formed in relief on its operative face.

6. A method according to claim 5 wherein the opposite face of the sheet is engaged by a die, the operative face of which has the marking formed thereon in intaglio or by a member having a locally yieldable surface.

7. A method of producing a sign member having a marking comprising the steps of acting upon opposite faces of a pre-formed sheet composed of laminae of pressure-deformable plastics materials as hereinbefore defined in solid form and of contrasting colours with a punch and die having the marking formed on their respective registering operative faces in relief and intaglio in a manner such as to effect a permanent deformation of the sheet and raise material in relief out of the exposed face of the lamina engaged by the die, the raised material including some material from the underlying lamina, and removing some or all of the raised material to produce an aperture or apertures in the first said lamina and hence exposure of the underlying lamina, thereby presenting the marking in the contrasting colour thereof on the background of the first said lamina.

8. A method according to any of the preceding claims wherein all of the raised material is removed to produce a marking flush with the face of the sheet out of which the marking was originally raised.

9. A method according to any of claims 1 to 7 wherein only some of the raised material, but sufficient thereof to expose the underlying lamina, is removed to produce a marking in relief of which the medial portion of each raised element is of the underlying lamina while the peripheral margin is of the background lamina.

10. A method according to any of the preceding claims wherein removal of the raised material is effected by abrasion.

11. A method according to any of claims 1 to 9 wherein the raised material is cut or

sheared by means moving substantially parallel to the face of the background lamina.

12. A method according to any of the preceding claims wherein the laminated material consists of fused laminae of polyvinyl chloride.

13. A method according to any of claims 1 to 11 wherein the laminated material consists of laminae of cellulose acetate secured together by adhesive.

14. A method according to any of the preceding claims wherein the lamina which is exposed through said aperture or apertures is of polyvinyl chloride or other "memory" plastics material and after such exposure is heated to cause it to recede from the surface of the apertured background lamina bordering on the aperture to produce a recessed marking.

15. A sign member formed of a piece of laminated sheet material the laminae whereof are formed of pressure-deformable plastics material as hereinbefore defined and are preunited with each other over their contiguous faces and of contrasting colours, one of the laminae forming the background for the marking having one or more apertures in accordance with the marking required and formed by indenting the underlying lamina to produce raised portions on the background laminae which are partly or wholly removed to expose the underlying lamina through the resulting aperture or apertures.

16. A sign member according to claim 14 wherein the underlying lamina extends into said aperture or apertures so as to lie flush or substantially flush with the face of the background lamina.

17. A sign member according to claim 14 wherein the background lamina has one or more raised but medially apertured portions, and a portion of the underlying lamina enters into the aperture or apertures of the raised portion or portions.

18. A sign member according to any of claims 15 to 17 wherein the laminated material consists of a sheet formed of two laminae of polyvinyl chloride each of the laminae having a thickness in the range 0.02" to 0.005".

19. A method of producing a sign member substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

20. A sign member comprising a piece of laminated sheet material of which an aperture in one lamina is penetrated by a portion of the adjacent lamina to provide a marking substantially as hereinbefore described with reference to and as shown in Figures 1 and 2 of the accompanying drawings.

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PROVISIONAL SPECIFICATION

Improvements in or relating to the Manufacture of Sign Members

We, NEEDLE INDUSTRIES LIMITED, a British Company, of 106 Edmund Street, Birmingham, in the County of Warwick, do hereby declare this invention to be described in the following statement:—

The present invention relates to a new or improved means for the visual presentation, indicia, data, characters, pattern or ornament (hereinafter referred to generically as markings), and further relates to a method of production of such means.

The invention has many possible fields of application among which may be mentioned the provision of sheets, panels, strips or tabs bearing markings of a kind to furnish identification operating or measurement data in a wide variety of apparatus or articles.

Further, the invention may be applied in cases where as an alternative or in addition to markings consisting of letters, numerals, symbols graduated or other positional indicia having a primarily utilitarian purpose, it is required to provide markings of decorative or ornamental form upon apparatus or articles.

According to the present invention a visually presented marking is produced by acting upon a sheet formed of laminae of contrasting colours so as to raise the marking in relief on the exposed face of one of the laminae of the sheet, and removing at least part of the raised marking to expose the underlying lamina and thereby present the marking in the contrasting colour thereof upon the background of the first said lamina.

The raised marking in relief may be formed in suitable cases by pressure exerted on the underlying face of the sheet by means of a stylus which may be of ball or roller-pointed form, and which is traversed over the underlying face to trace out the marking required.

In such a case support for the opposite face of the sheet i.e. that from which the relief is to be raised might be afforded by a further travelling member having a sheet supporting face formed with a recess or indentation which is maintained in registration with the stylus.

In a preferred manner of carrying out the method, however, the raised marking in relief is formed by a pressing operation conducted against the underlying face of the sheet with a punch having the marking formed in relief on its operative face. The opposite face of the sheet may be engaged by a die the operative face of which has the marking formed thereon in intaglio.

The invention further resides in a method of producing a visually presented marking comprising the steps of acting upon opposite

faces of a sheet formed of laminae of contrasting colours with a punch and die having the marking formed on their respective registering operative faces in relief and intaglio in a manner such as to raise the marking in relief out of the exposed face of the lamina engaged by the die the raised material including some from the underlying lamina, and removing some or all of the raised material to produce an exposure of the underlying lamina defining the marking required.

The removal of all of the raised material will produce a marking flush with the face of the sheet out of which the marking was originally raised. The removal of only some of the material but sufficient to expose the underlying lamina will produce a marking in relief of which the medial portion of each raised element will be of the underlying lamina while the peripheral margin will be of the background lamina.

Various methods of removal of the raised material may be employed, for example the material may be abraded.

A particularly advantageous method and one which is found to produce sharp outlines in the marking is to cut or shear the raised material by a blade moved parallel to the face of the background lamina.

The laminated sheet material used in carrying out the method may advantageously consist of or comprise laminae of a suitable plastics material united together by fusion or by an adhesive the material being such as to be capable of undergoing permanent local deformation without fracture either in the cold (i.e. at normal atmospheric temperature) or under suitable heating conditions.

We have found that fused laminae of polyvinyl chloride are especially suitable for use in carrying out the method. Alternatively we may use laminae of cellulose acetate secured together by adhesive.

A further part of the invention resides in the provision of a means for the visual presentation of markings, comprising a piece of sheet material formed of laminae of contrasting colours, wherein one of the laminae forming the background for the marking has apertures collectively defining the marking required and formed by indenting the underlying lamina to produce raised portions on the background lamina which are partly or wholly removed to expose the underlying lamina through the resulting apertures.

In one form the background lamina may have apertures collectively defining the marking required and the underlying lamina extends into said apertures so as to lie flush or substantially flush with the face of the background lamina.

Alternatively the marking may comprise raised but medially apertured portions on the background lamina and portions of the underlying lamina entering into said apertures.

The final level of the face portions of the underlying lamina exposed through the apertures may be flush with the face of the background lamina bordering on the apertures or below this face the latter arrangement being attained by suitable heat or other treatment of the background lamina to reduce the residual deformation and partly or completely restore it to its undeformed state.

In the foregoing method and in the means for the visual presentation of marking produced thereby it will generally be convenient to use a laminated sheet formed of two laminae, but it is to be understood that the invention includes the use of sheets formed of a greater number of laminae when desired.

In one specific manner of carrying out the invention as applied to the production of panels, strips or tabs bearing markings appropriate to the paticular use to which these means are to be put the material utilised may be sheet or strip formed of two laminae of polyvinyl chloride which are fused or otherwise caused to adhere together.

Each individual lamina preferably has a thickness lying in the range 0.02 inches to 0.005 inches for example 0.015 inches although in particularly cases this preferred range may be exceeded if a particularly stiff or rigid panel, strip or tab is required.

The laminae may be of different colours, for example one of them may be white and the other any desired colour such as red, green, blue etc. or alternatively the laminae may be of the same colour but of differing shades so that there is a sufficient contrast to permit one of the laminae to be readily observed visually against the background of the other.

To produce the required marking the strip or sheet is operated upon by press tools engaging opposite faces, one of these tools, that engaging the face which is required to constitute the background for the marking, being in the form of a die in which the marking is formed in intaglio, and the other of the tools which engages the exposed face of the underlying lamina being in the form of a punch having the marking form thereon in relief.

The marking may be in the form of letter press, of a figure, or indicia such as scale graduations or symbols, and the cross sectional shape of the formations on the punch which stand out in relief to produce these markings is preferably of triangular or truncated triangular form the truncated apex being outermost.

We have found that in practice an apex angle of 30° for this cross section produces good results when using polyvinyl chloride sheet of the dimensions hereinbefore set forth but this angle can be varied to suit differing materials and to produce markings formed of lines of varying widths as may be appropriate in any particular case.

The intaglio formation provided in the

operative face of the die may be an exact mate of the relief formation provided on the punch but preferably we arrange that in the limiting position of closure of these tools towards each other there is a uniform or approximately uniform separation between opposed portions of the relief and intaglio formations, this separation being somewhat less than the thickness of the laminated sheet but somewhat greater than the thickness of one of the individual laminae.

With this arrangement engagement of the sheet between the tools results in a combination of a drawing and bending operation upon the displaced elemental areas of the sheet and the raised portion which is produced on the face of the background lamina has a thickness which is generally somewhat less than the surrounding undeformed portion of the laminated sheet.

The next stage of operation is to remove some or all of the raised portion of the material so as to expose the underlying lamina through the resultant aperture formed in the background lamina.

This removal may be effected by a plane or knife blade moving parallel to the exposed face of the background lamina and in contact therewith or with a very small clearance above such face. This operation will produce a flush finish, that is to say, the portion of the underlying laminae extending into the aperture of the background laminae will be flush with the surface of the latter but it will be understood that if desired only a part of the raised portion need by removed if desired.

Furthermore, the application of heat to the underlying lamina will subsequently tend to cause the raised portion thereof to recede somewhat and this proceedure may be utilised to produce a recessed marking when required

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1 SHEET

COMPLETE SPECIFICATION

FIG. 1.

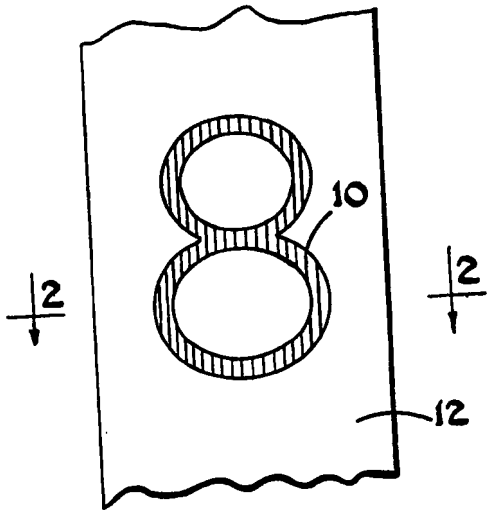

FIG. 2.

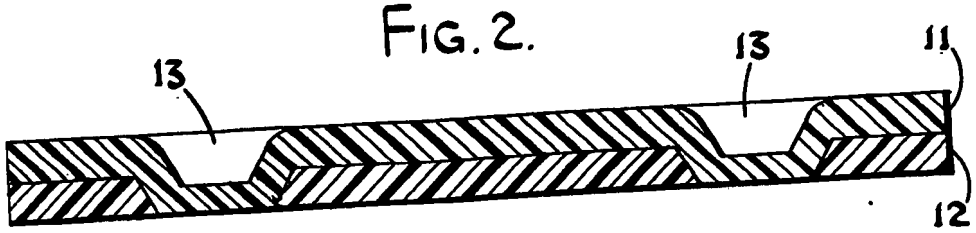

FIG. 3.